What is claimed is:

1. An apparatus for detecting a direction of a target to be detected by transmitting and receiving radio waves through a plurality of transmission/reception channels causing a phase difference in signals to be received through the transmission/reception channels and calculating the direction based on the phase difference, at least one of transmission and reception antennas being provided to form the plurality of transmission/reception channels, the apparatus comprising:

a direction calculating device configured to calculate the direction of the target based on the phase difference in the received signals on the assumption that the phase difference is within a range of $-\pi$ to $+\pi$ [rad]:

a range determining device configured to determine that the target exists in any of azimuthal angle ranges each corresponding to ranges defined by $(2m-1)\pi$ to $(2m+1)\pi$ [rad] (m is an integer): and

a direction correcting device configured to correct the direction calculated by the direction calculating device according to a result determined by the range determining device.

2. The apparatus according to claim 1, further comprising a memory device for memorizing history information in relation to positional information including at least the direction target by target,

wherein the range determining device is configured to determine the azimuthal angle range on the basis of the history information memorized by the memory device.

3. The apparatus according to claim 1, further comprising an imaging device configured to acquire a two-dimensional image through a field of view of an angular range being wider than and including the azimuthal angle range corresponding to the range of $-\pi$ to $+\pi$ [rad] of the phase difference; and

a distance calculating device configured to calculate a difference of the target based on transmitted and received signals of the radio waves,

wherein the range determining device comprises:

a mapping member configured to map, every azimuthal angle range, a position at which the target is to be detected on the

two-dimensional image acquired by the imaging device on the basis of each direction respectively calculated using the phase difference between the received signals on the assumption that the phase difference is within each of ranges defined by $(2m-1)\pi$ to $(2m+1)\pi$ [rad] and the distance calculated by the distance calculating device;

a first determination member configured to determine whether or not the target is imaged at each position on the two-dimensional image acquired by the mapping member; and

a second determining member configured to determine the azimuthal angle range in which the target exists, on the basis of a determined result of the first determination member.

4. The apparatus according to claim 3, wherein the imaging device is a CCD camera.